text-books on the subject (*e.g.* Rosenbusch's "Microscopical Physiography") as being cut "so that one of its faces is exactly parallel to the principal axis (optic axis, axis of least elasticity)." The difficulty in getting, say, iron-grey of the first order depends on the extreme thinness of the quartz required at the thin end of the wedge.

Now the interference colour given by plates of equal thickness of the same mineral depends on the direction in which they are cut, varying from a maximum when the plate is parallel to the optic axis to zero when the plate is perpendicular to that direction (assuming the mineral to be uniaxial). If, then, a wedge be made having one face parallel to some such direction as, say, an *r* or *z* face of the quartz crystal and its length in the direction of the trace of the vertical plane of symmetry through that face, it will give the same results as the ordinary quartz wedge, but, for the same thickness, will give a lower colour, so that the colours at its thin end may be got very low. On trial a wedge made in this way gave very satisfactory results.

The compound wedge described below, which, so far as I know, is also new, was found to be still better. Suppose a sheet of muscovite be taken, its axes of elasticity determined, and a strip cut of the same size and shape as the quartz wedge with the axis of greatest elasticity parallel to its greatest length. If the wedge is covered with the mica plate and examined between crossed Nicols, there will, of course, be a black compensation band in some position, and by cleaving the mica thinner this band can be made to move towards the thin end of the wedge, and finally to coincide with it. The mica is now cemented to the quartz, and a wedge is produced which gives *all* the colours of the first order. By the use of this compensation mica plate a very poor wedge may be converted into a first-class instrument, or one broken at its thin end restored to usefulness. DANIEL JAMES MAHONY.

The Grand Hotel, Melbourne, Victoria, June 25.

Colour Phenomena in "Boletus cœrulescens."

ONE day recently in the woods at Lynton (where the soil is red) I found and gathered two very beautiful toad-stools, with vermilion stem and bright, sulphur-coloured hymenium. In these individuals the striking colour phenomena peculiar to their family were remarkably in evidence; *in the brilliant sunlight* on the bright yellow under-surface of the pileus I found my name when traced in the most gentle way shine out almost immediately in the most magnificent of blues.

Will any of your readers kindly refer me to any recent papers concerning the chemical or physical processes which underlie this fascinating demonstration? From my own superficial observations it is evident, I think, that light plays an important part. The energy liberated by the very gentlest friction appears to be a sufficient initiative.

Parts that have been rendered blue, when left at rest, after a short time return to yellowness, but these same parts are capable under fresh stimulus, so long as the fungus is still alive, of again assuming temporary blueness.

The juice expressed from blue areas is itself bright blue, and imparts a bright blue stain to linen. Upon my handkerchief this colour remained so long (at least five hours) that I thought I had fixed it; but in the morning the *dry* blue patch of the night before was no longer blue, but yellow.

On cutting the stem its upper two-thirds was found endowed with the property of cœrulescence; but this was not in any degree possessed by its lower third, in which the cut surfaces remained of a reddish-brown colour. With the exception of the lower part of the stem and the cuticle, all the tissues of the fungus exhibited cœrulescence.

I take special interest in these observations on account of certain phenomena noticeable in human tissues in the course of a somewhat rarely met with pathological condition which has been described under the name chloroma.

Without entering into details, I may remark that along with the colour development which characterises this pathological condition hæmoglobin is probably being extensively set free from red blood cells, and presumably this body or its derivatives are abnormally abundant in the body fluids. Is there any known organic iron-containing body capable of being responsible for these quick-change effects?

EDGAR TREVITHICK.

Strength of a Beetle.

LAST night a small beetle (*Aphodius fossor*), the length of which is $\frac{1}{2}$ inch, flew in at my window and alighted on a table next to me. As it buzzed about I put a lid of a tin box over it, but to my surprise the beetle walked about bearing the lid on its back. I then put the tin box on the top of the lid, and was absolutely amazed to find that the insect tilted up a corner of the combined box and lid, and nearly escaped. The weight of the beetle when dead was $\frac{1}{2}$ grain, alive I suppose it was a little more; but the box and lid weighed 1758 grains! Assuming that the living insect weighed 1 grain, it must have tilted up 1758 times its own weight! Of course, the strength required to tilt up a box on edge is nothing like so great as that required actually to lift the weight, but nevertheless the feat seems to me sufficiently astounding. The dimensions of the box are $3\frac{5}{8} \times 2\frac{3}{8} \times 1\frac{1}{2}$ inches.

CHARLES R. KEYSER.

The Gables, Hayward's Heath, July 26.

THE INTERNATIONAL CELEBRATION OF THE JUBILEE OF THE COAL-TAR INDUSTRY.

DURING the last century no discovery, perhaps, has led to such far-reaching and important developments as that of mauve, the first aniline dye, by William Henry Perkin. Not only was the door thrown open to the never-ending procession of artificial colouring matters, but the raw materials necessary for their production were also the raw materials for the synthesis of whole series of entirely different substances, which have now assumed most important positions in the world's daily requirements.

It cannot be too often repeated that Perkin's discovery was the result of true scientific devotion to pure research. The synthetic preparation of quinine was the goal aimed at—a sufficiently ambitious one for a lad of seventeen, for the problem is yet unsolved. Perkin did not state, as is perhaps too often done nowadays, that "only a black mass was obtained." His persevering and scientific habit of mind led him to investigate the "black mass," with the result that by extraction with alcohol was isolated the violet dye which is so closely associated with his name.

Great though Perkin's discovery was, yet greater still were the zeal, industry, and genius of the boy of eighteen which enabled him to make the dyestuff on the large scale and place it on the market successfully. Only those who have had experience in large-scale preparations can realise what this must have meant. New plant, new materials, new conditions: all had to be undertaken, and in the introduction of iron vessels for the manufacture of his raw material, aniline, Perkin laid the vast aniline oil industry under lasting obligation.

The start thus given, many entered the field; by a slight variation of Perkin's process Renard and Franc introduced the splendid crimson dye "magenta" in France, whilst shortly afterwards Simpson, Maule, and Nicholson started the manufacture of this colour in London. The happy collaboration of A. W. Hofmann, the college professor, with the splendid technical chemist and business man, E. C. Nicholson, soon not only placed the London firm in a commanding position, but gave to the world those researches on rosaniline for which Hofmann became so famous.

In the meantime, Perkin not only manufactured mauve, but was steadily working at the artificial products of alizarine, which he was able to obtain in 1868, and immediately produced it on the large scale. In 1873, recognising that a very largely increased manufacturing scale was necessary for the highest degree of success (a principle since so thoroughly carried out by the large German firms), Perkin decided to retire from business, and his works were sold. After some vicissitudes the business was transferred to Silvertown, where the British Alizarine Company carries on a large and successful manufacture of alizarine dyes.

From the beginning the development of the industry steadily continued, both in England and on the Continent. In 1859 Griess, a chemist employed at Allsopp's Brewery, discovered the first azo dye, which was manufactured in 1863 by Simpson, Maule, and Nicholson. This was the starting point of one of the most important branches of the colour industry, and was rapidly followed by many brilliant discoveries by Hofmann, Nicholson, Caro, Martius, and Witt in England, Girard and De Laire and Poirrier in France, and Baeyer, Böttiger, Duisberg, and many others in Germany.

The outcome of this has been that the colour industry has progressed to one of enormous importance. The combination of scientific research and business skill so strikingly exampled by Perkin and Nicholson has been applied in Germany with marvellous success, and has resulted in the development of several great firms, each employing several thousands of workmen and hundreds of chemists and engineers.

The example set by Englishmen has not been followed to the same extent in this country, and the industry, affected by the fall of one or two historic houses, has progressed but slowly.

In failing to synthesise what is perhaps the most important aid known to medicine, Perkin gave to medicine its most potent drugs; for the separation of hundreds of products from coal-tar has enabled chemists to prepare phenacetin, antipyrin, antifebrin (the latter actually produced on the large scale as a bye-product by Perkin), and many others. Extensive manufactories of saccharin, photographic developers, and pharmaceutical products have been erected, and, indeed, it is difficult to say where the far-reaching influence of Perkin's discovery may end.

One thing is sure, it is not to be measured by mere statistics; in the words of Hofmann, "the moral of Mauve. . . . is transparent enough. Whenever one of your chemical friends, full of enthusiasm, exhibits and explains to you his newly-discovered compound, you will not cool his noble ardour by asking him that most terrible of all questions, 'What is its use? Will your compound bleach or dye? Will it shave? May it be used as a substitute for leather?' Let him quietly go on with his work. The dye, the leather, will make their appearance in due time. Let him, I repeat, perform *his* task. Let him indulge in the pursuit of truth,—of truth pure and simple,—of truth not for the sake of Mauve,—let him pursue truth for the sake of truth!"

It was a peculiarly happy circumstance that the meeting to honour Sir William Henry Perkin should have been held in the Royal Institution. The most elementary constituent of coal-tar, viz. benzene, was discovered here by Faraday in 1825, and this was followed by Perkin's own discovery of mauve in his home laboratory. "Let me tell you then," said Hofmann in the lecture room in 1862, "that Mauve and Magenta are essentially Royal Institution colours: the foundation of this new industry was laid in Albemarle Street."

The whole of the chemical world was represented at the meeting on July 26, which was presided over by Prof. R. Meldola, F.R.S. It is only necessary to mention such names as Emil Fischer, H. Caro, Albin Haller, P. Friedländer, C. Duisberg, G. Schultz, A. Bernthsen, C. Liebermann, R. Möhlau, in order to indicate that the very foremost of foreign chemists were present, and all the representative English men of science and technology were to be seen at this historic gathering. The presentation of the Hofmann and Lavoisier gold medals, the foreign university degrees, and the great number of congratulatory addresses gave ample proof, were it needed, of the admiration with which all chemists regard the founder of this great industry.

At the dinner in the Whitehall Rooms in the evening (Prof. Meldola in the chair), tributes were paid by an even wider circle of appreciative admirers. Mr. Haldane, His Majesty's Secretary of State for War (who proposed the toast of the evening), the Earl of Halsbury, Lord Alverstone, Sir William Broadbent, Sir Henry Roscoe, Profs. E. Fischer and A. Haller, Sir Robert Pullar, and the chairman pointed out the benefits accruing, not merely to the colour industry, the dyeing trade, the medical profession, and science at large, but also to the whole world.

On the following day Sir William and Lady Perkin entertained a large number of guests at The Chestnuts, Sudbury, near Harrow. The old Greenford works and Sir William's private laboratory were visited, whilst in the beautiful garden one saw the madder plants which came from the late Dr. Schunck's garden in Manchester.

Sir William and Lady Perkin's reception in the Hall of the Leathersellers' Company concluded the festivities, which will never be forgotten by those who were privileged to take part in them.

J. C. CAIN.

THE SPORADIC PUBLICATION OF SCIENTIFIC PAPERS.

IN these latter days the development of science has led to an inverted fulfilment of the old prophecy, "Men shall run to and fro and knowledge shall be increased." Nowadays men have to run to and fro because knowledge is increased. A very considerable portion of the time of a man of science is taken up in "running to and fro" seeking for the papers which he wishes, which, indeed, he is bound to consult. There are various ways in which much of the time thus spent might be saved, and some of these ways are being more or less successfully made use of. One cause, however, of this "running to and fro" deserves special attention, because it seems really unnecessary, and the time spent through its continuance may be said to be time wholly wasted.

It has been my lot to receive almost at the same time a number of the Journal of the Marine Biological Association, a volume of the Scientific Memoirs of the Officers of the Medical and Sanitary Departments of the Government of India, a volume of the Thompson-Yates and Johnston Laboratories Reports, and the annual Report of the Medical Officer of Health to the Local Government Board.

All these contained papers of great scientific value, and I feel sure that many besides myself are continually having brought before them similar instances of the abundance of what I venture to call the sporadic publication of scientific papers. This has been very strikingly brought home to those who have had to